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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/17/2003

Teruo Fujii

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EXAMINER

HYUN, PAUL SANG HWA

ART UNIT

PAPER NUMBER

1797

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/664,436	<b>Applicant(s)</b> FUJII ET AL.	
	<b>Examiner</b> PAUL S. HYUN	<b>Art Unit</b> 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 24 June 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-8,10-12,14-17 and 19-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-8,10-12,14-17 and 19-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>06/24/09</u> .  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

The amendment filed on May 22, 2009 and the supplemental amendment filed on June 24, 2009 have been acknowledged. In the initial amendment, Applicant amended claims 1, 6, 10 and 15. In the subsequent filing, Applicant added new claims 20-31. In summary, claims 1-3, 5-8, 10-12, 14-17 and 19-31 are pending for examination on the merits.

The IDS filed on June 24 has been acknowledged.

### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims **1-3, 5, 15-17 and 19-23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Karp et al. (US 2002/0155010 A1) in view of Dubrow et al. (US 6,251,343 B1) and Roscher et al. (US 6,458,325 B1).

Karp et al. disclose a microfluidic device comprising substrates that are adhered to one another (see Figs. 1A-1D and [0026]). The device comprises a base layer 20, a pump unit 21, and a channel unit 22. The pump unit and the channel unit each comprise a through hole, the through holes being aligned to function as an inlet port 28. The pump unit 21 comprises a first joint surface that contacts a second joint surface of the channel unit 22. The pump unit comprises a pumping chamber and a piezoelectric transducer that actuates a wall of the chamber to transport fluid from the pumping chamber of the pump unit 21 to the channel unit 22 (see [0012] and Fig. 1D). The device disclosed by Karp et al. differs from the claimed invention in that Karp et al. do

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not disclose that the substrate layers are made from an elastic material that has self-sealing features. In addition, Karp et al. do not disclose the claimed throttle channels.

With respect to the elastic material, Dubrow et al. disclose a microfluidic device comprising a plurality of layers made from PDMS (see line 65, col. 3), which is transparent and elastic. The attachment and the alignment of the layers can be facilitated by providing alignment pins on one layer and corresponding holes in the mating layer (see lines 18-21, col. 10). In light of the disclosure of Dubrow et al., it would have been obvious to one of ordinary skill in the art to make the layers disclosed by Karp et al. out of PDMS and attach the layers using alignment pins/holes instead of an adhesive so that the device can be disassembled for cleaning.

With respect to the throttles, Roscher et al. disclose a microfluidic device comprising a pumping chamber actuated by a piezoelectric element 20 situated exterior to the pumping chamber (see Figs. 3 and 4). To control the direction of flow, the inlet of the chamber is connected to a throttle 14 of a shorter length and the outlet of the chamber is connected to a throttle 15 of a longer length (see Fig. 3). The throttles are configured such that the flow resistance of throttle 14 is greater than the flow resistance of throttle 15 (see Fig. 3 and claim 2). It would have been obvious to one of ordinary skill in the art to connect the inlet and the outlet of the pumping chamber disclosed by Karp et al. with throttles configured as disclosed by Roscher et al. so that the direction of fluid pumped by the piezoelectric element can be controlled.

With respect to the limitation "wherein pressure dependence...wave form of the piezoelectric element" recited in claims 1 and 15, it should be noted that the limitation

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does not further limit the structure of the invention because the limitation merely explains a phenomenon that occurs when the claimed piezoelectric element is actuated. The limitation does not impart any additional structural feature to the invention.

With respect to claim 23, although none of the references disclose a second pumping chamber having a second pumping mechanism, it would have been obvious to one of ordinary skill in the art to form parallel channels in the layers of the modified Karp et al. device wherein each channel is connected to a pumping mechanism so that the device can process multiple samples concurrently.

Claims **6-8, 10-12, 14, 24-31** are rejected under 35 U.S.C. 103(a) as being unpatentable over Karp et al. in view of Dubrow et al. and Roscher et al.

Karp et al. disclose a microfluidic device comprising multiple substrates that are adhered to one another (see Figs. 1A-1D and [0026]). The device comprises a base layer 20, a pump unit 21, a sheet-like member 22, and a channel unit 23. The pump unit, the sheet-like member, and the channel unit each comprise a through hole, the through holes being aligned to function as an inlet port 28. The pump unit comprises a pumping chamber and a piezoelectric transducer that actuates a wall of the chamber to transport fluid from the pumping chamber of the pump unit 21 to the channel unit 23 (see [0012] and Fig. 1D). The device disclosed by Karp et al. differs from the claimed invention in that Karp et al. do not disclose that the substrate layers are made from an

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elastic material that has self-sealing features. In addition, Karp et al. do not disclose the claimed throttle channels.

With respect to the elastic material, Dubrow et al. disclose a microfluidic device comprising a plurality of layers made from PDMS (see line 65, col. 3). The attachment and the alignment of the layers can be facilitated by providing alignment pins on one layer and corresponding holes in the mating layer (see lines 18-21, col. 10). In light of the disclosure of Dubrow et al., it would have been obvious to one of ordinary skill in the art to make the layers disclosed by Karp et al. out of PDMS and attach the layers using alignment pins/holes instead of an adhesive so that the device can be disassembled for cleaning.

With respect to the throttles, Roscher et al. disclose a microfluidic device comprising a pumping chamber actuated by a piezoelectric element 20 situated exterior to the pumping chamber (see Figs. 3 and 4). To control the direction of flow, the inlet of the chamber is connected to a throttle 14 of a shorter length and the outlet of the chamber is connected to a throttle 15 of a longer length (see Fig. 3). The throttles are configured such that the flow resistance of throttle 14 is greater than the flow resistance of throttle 15 (see Fig. 3 and claim 2). It would have been obvious to one of ordinary skill in the art to connect the inlet and the outlet of the pumping chamber disclosed by Karp et al. with throttles configured as disclosed by Roscher et al. so that the direction of fluid pumped by the piezoelectric element can be controlled.

With respect to the limitation "wherein pressure dependence...wave form of the piezoelectric element" recited in claims 6 and 10, it should be noted that the limitation

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does not further limit the structure of the invention because the limitation merely explains a phenomenon that occurs when the claimed piezoelectric element is actuated. The limitation does not impart any additional structural feature to the invention.

With respect to claims 27 and 31, although none of the references disclose a second pumping chamber having a second pumping mechanism, it would have been obvious to one of ordinary skill in the art to form parallel channels in the layers of the modified Karp et al. device wherein each channel is connected to a pumping mechanism so that the device can process multiple samples concurrently.

### ***Response to Arguments***

Applicant's arguments with respect to the claims have been considered but they are moot in view of the new grounds of rejection. The amendment necessitated the new grounds of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PAUL S. HYUN whose telephone number is (571)272-8559. The examiner can normally be reached on Monday-Friday 8AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571)-272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Paul S Hyun/  
Examiner, Art Unit 1797

/Jill Warden/  
Supervisory Patent Examiner, Art Unit 1797